PATENT ABSTRACTS OF JAPAN

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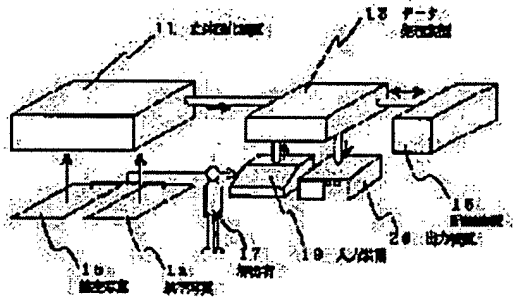
(54) METHOD FOR PREPARING MAP DATA

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a map data preparing method capable of easily preparing contours matched with an actual geography by the use of aerial photographs.

SOLUTION: The analytical ranges of aerial photographs 1a, 1b and their peripheries are analyzed by a solid figure preparing device 11 and geographic data are stored in a storage device 15 to prepare a primary contour. An analyzer 17 observes the photographs 1a, 1b, grasps geographic features such as peaks, main ridge lines, ridgelines, valley lines, precipice lines, and hill-like ridgelines, inputs these features with an input device 19 approximately to dot data and vector data and stores the data in the storage device 15. The detailed parts of the primary contour are corrected based upon the geographic data inputted by the analyzer 17 to obtain a corrected contour.



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CLAIMS

[Claim(s)]
[Claim 1] It is the map data origination approach of performing digital mapping using pictorial drawing-ized equipment to one pair of aerial photograph for stereopsis which photoed predetermined photographic coverage. (a) The process which sets a criteria ground point group as an analytical range in a predetermined array, and memorizes the plane-coordinates value of each key station, (b) The process which measures and memorizes each altitude value of said criteria ground point group, and the process which judges distribution of the ridge line in the (c) aforementioned analytical range, and a valley line, (d) The process which memorizes said ridge line as a series of vector data, and the process which memorizes the (e) aforementioned valley line as a series of vector data, (f) The process which judges the steep slope range in said analytical range, and memorizes the boundary line of said steep slope range as vector data which plurality followed, (g) in the ridge crossover part of the process which calculates the contour line for every predetermined altitude as a continuation coordinate group, and the (h) aforementioned contour line and said ridge line using the location and altitude value of said criteria ground point group Said continuation coordinate group around this ridge crossover part in the valley line crossover part of the process corrected to a side with the low altitude of a ridge line, and the (i) aforementioned contour line and said valley line Said continuation coordinate group around this valley line crossover part in the steep slope range crossover part of the process corrected to a side with the high altitude of a valley line, and the (j) aforementioned contour line and said steep slope range The map data origination approach characterized by providing the process which corrects said continuation coordinate group around this steep slope range crossover part so that it may become parallel to the boundary line of said steep slope range.
[Claim 2] The map data origination approach indicated by claim 1 characterized by classifying said ridge line into the main ridge line and ********, distinguishing it as a series of vector data, respectively, and memorizing it in said process (d).
[Claim 3] Said steep slope range is the map data origination approach indicated by claim 1 characterized by being a thing about a cliff or a pinion wall.
[Claim 4] Said plane-coordinates value indicated by (f) from said process (a), said altitude value, and said vector data are the map data origination approach indicated by claim 1 characterized by being a thing including the process which corrects geometrically the scale of each part of the photograph by the altitude at the time of photography of said aerial photograph, and distortion of the photograph by the include angle at the time of photography.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the map data origination approach to which the chart of the contour line can be carried out easily and exactly using aerial photograph.
[0002]
[Description of the Prior Art] Conventionally, in creation of the contour line of the topographical map by the aerial survey, two aerial photograph with which the photography region photoed from two points which only a predetermined distance left in predetermined altitude high up in the sky overlaps dozens of% was set in pictorial drawing-ized equipment, and the chart of the contour line was carried out on the basis of the altitude value of a point surveyed on the ground.
[0003] The aerial photograph flight height for performing an aerial survey changes with scales of the map to create. With 1/10,000 of the maps of a small scale, with the flight altitude of 10,000 meters, a photograph is taken, or the flight root is made to approach, and a photograph is taken so that the photography region may overlap, so that the photography region may overlap with the camera which carries out a parallel displacement with an airplane.
[0004] Moreover, in creating 1/1000 of the maps of a large scale, one pair of cameras set to the both wings of an airplane at the low altitude with a flight altitude of about 2000 meters perform coincidence photography.
[0005] Moreover, the approach of carrying out the chart of the contour line only from the altitude value of many known points using a computer has also spread, and the algorithm which generates a contour line from the altitude value of each mesh intersection set up on the map is developed in the Geographical Survey Institute etc. in recent years. Furthermore, in recent years, the technique of generating a contour line from the altitude value data of the point of much arbitration on a map is developed.
[0006]
[Problem(s) to be Solved by the Invention] However, the flight height in the case of creating the map of a large scale is an about 2000-meter low altitude, and follows risk on photographing work. Moreover, in order to draw the high line which is precision, such as being high, the altitude value data in a very fine consistency were required. Moreover, since it was necessary to search for many coordinates along which a contour line should pass in order to draw a contour line with a natural curve, the very big amount of data was required. Therefore, the storage capacity of a computer was needed very greatly and many costs were required.
[0007] This invention was made in view of such a problem, and the place made into the purpose is to offer the map data origination approach which can draw an exact contour line by the easy activity.
[0008]
[Means for Solving the Problem] As opposed to one pair of aerial photograph for stereopsis with which this invention photoed predetermined photographic coverage in order to attain the purpose mentioned above The process which is the map data origination approach of performing digital mapping using pictorial drawing-ized equipment, sets a criteria ground point group as the (a) analytical range in a

predetermined array, and memorizes the plane-coordinates value of each key station, (b) The process which measures and memorizes each altitude value of said criteria ground point group, and the process which judges distribution of the ridge line in the (c) aforementioned analytical range, and a valley line, (d) The process which memorizes said ridge line as a series of vector data, and the process which memorizes the (e) aforementioned valley line as a series of vector data, (f) The process which judges the steep slope range in said analytical range, and memorizes the boundary line of said steep slope range as vector data which plurality followed, (g) in the ridge crossover part of the process which calculates the contour line for every predetermined altitude as a continuation coordinate group, and the (h) aforementioned contour line and said ridge line using the location and altitude value of said criteria ground point group Said continuation coordinate group around this ridge crossover part in the valley line crossover part of the process corrected to a side with the low altitude of a ridge line, and the (i) aforementioned contour line and said valley line Said continuation coordinate group around this valley line crossover part in the steep slope range crossover part of the process corrected to a side with the high altitude of a valley line, and the (j) aforementioned contour line and said steep slope range It is the map data origination approach characterized by providing the process which corrects said continuation coordinate group around this steep slope range crossover part so that it may become parallel to the boundary line of said steep slope range.

[0009] By the map data origination approach concerning this invention, the vector data about a part with the geographical feature-description which affects the irregularity of the curve of a contour line first is memorized. Next, in the part where the first contour line drawn from the altitude value data distributed over punctiform and a vector cross, the first contour line is corrected so that the geographical feature-description may be suited. Therefore, an exact contour line can be drawn easily, without increasing so much the amount of data which should be memorized.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail based on a drawing. Drawing 1 is the mimetic diagram showing one example of the photography approach of aerial photograph 1a and 1b. Flying by the predetermined flight height 5, it makes the same timing which turns off a shutter by camera 7a and camera 7b which were prepared in parallel so that a predetermined direction may be photoed at the both wings of an airplane 3, and an airplane 3 photos the terrestrial region. In the example of drawing 1 , although only Cameras 7a and 7b are formed, more cameras may be formed and a photograph may be taken at once.

[0011] A flight height 5 can be set as arbitration. The aerial photograph used for analysis is taken by 10000m, others of 7000m, for example, altitude, and aerial photograph with decomposition capacity more precise than 10cm etc. can be used for it. [photograph / which was taken at the about / 2000m / low altitude]

[0012] The aerial photograph 1a and 1b taken by each of Cameras 7a and 7b is taken so that the duplication section 9 may arise, and it becomes possible [analyzing geographical feature about this duplication section 9]. Spacing of one pair of cameras which can obtain 1 set of aerial photograph suitable for the analysis of the duplication section 9 by a flight height 5 etc. differs. In being enough spacing between the edges of the both wings of one airplane 3, it prepares camera 7a and camera 7b in the both wings of an airplane 3. In addition, when bigger spacing is required, the parallel displacement of the airplane 3 may be carried out, and it may be photoed, or the flight root may be made to approach and a photograph may be taken.

[0013] Generally with the photograph, the periphery is reduced and projected compared with the center section of the photograph, and the reduction percentage of each part of a photograph changes with the altitude and the include angles at the time of photography. Therefore, distortion of these aerial photograph 1a and 1b is amended on a geometrical target, respectively, geographical feature is analyzed, or after performing topographical analysis, it maps by performing geometric amendment. It becomes possible by always maintaining Cameras 7a and 7b at a horizontal by automatic control to acquire the easy photograph of amendment of distortion.

[0014] Drawing 2 is drawing showing data processing to the aerial photograph 1a and 1b concerning the

gestalt of operation of this invention. Aerial photograph 1a and 1b is set in pictorial drawing-ized equipment 11, and analysis of geographical feature data is performed. Such distortion uses many data of photography and photograph creation time, or aerial photograph 1a and 1b collates existing map data and an existing correspondence point, although the scale of each part of a photograph may change with conditions of a flight height 5 and photograph creation time and the photograph may be distorted compared with actual earth surface with the include angle at the time of photography, and it is corrected geometrically.

[0015] The altitude data of the aerial photograph 1a and 1b obtained through pictorial drawing-ized equipment 11 are sent to a data processor 13, and data are arranged by predetermined format and memorized by storage 15.

[0016] An analyst 17 observes aerial photograph 1a and 1b, and using the plotting instrument by macroscopic stereopsis, and grasps the description of the geographical feature of the analysis region. [using a stereoscope] Next, an analyst 17 classifies the description of the acquired geographical feature, using an input device 19, approximates geographical feature data as point data or vector data, and inputs them. When input devices 19 are a digitizer, a tablet, monitor display, a mouse, etc., point data specify a point, and vector data specifies and inputs a both-ends point. In addition, there is also the approach of inputting the thing describing the description of geographical feature into paper, a film, etc., using an image scanner as an input unit 19.

[0017] The data inputted from the input device 19 are arranged by predetermined format with a data processor 13, and are memorized by storage 15. The data got by the analyst 17 as well as the data from pictorial drawing-ized equipment 11 are corrected geometrically, and both are memorized on the same coordinate.

[0018] The input data in the chart of a contour line, progress, and a result are suitably outputted by the output unit 20. As an output unit 20, there are an electro static plotter, an ink jet printer, hard copy, a monitoring screen, etc.

[0019] Drawing 3 is a flow chart which shows the outline of creation of a contour line. An analyst 17 performs topographical analysis using aerial photograph 1a and 1b, vector-data-izes the description of the geographical feature of a ridge line, a valley line, a cliff, etc., and makes storage 15 memorize (step 301). Moreover, the data of the continuation coordinate group which is the approach of altitude data to arbitration and constitutes a contour line are computed (step 302). At step 302, if the existing data about the continuation coordinate group of a contour line are obtained, an axis of coordinates can be used by arranging identically to vector data. In addition, this step 301 and step 302 may have reverse sequence.

[0020] Next, the continuation coordinate group which constitutes a contour line is partially corrected using the vector data which shows the description of geographical feature (step 303). In step 303, it asks for the location of the intersection of a vector and the line which connects a continuation coordinate group by count, and the coordinate of the continuation coordinate group in near [said] an intersection is corrected.

[0021] Drawing 4 is drawing showing one example of arrangement of the reference point 23 prepared in order to make an analytical range 21 generate a contour line. The duplication section 9 of aerial photograph 1a and 1b is prepared so that the analytical range 21 which is going to generate a contour line may be included. The reference point 25 outside an analytical range is set up by the predetermined arrangement same besides the reference point 23 prepared by predetermined arrangement in the analytical range 21 also as the exterior of an analytical range 21.

[0022] The data memorized by the store 15 about an origin/datum 23 and the origin/datum 25 outside an analytical range are a plane-coordinates value and an altitude value. the plane-coordinates value for calculating and asking for a contour line -- (**) -- LONG and the LAT, and (**) -- a suitable thing is chosen from the coordinate value in the earth surface on the basis of a certain point, or (Ha) the coordinate value on a Fig. As for an altitude value, the altitude value in earth surface is used as it is.

[0023] In carrying out the chart of the contour line, to compensate for the scale of the map which it is going to create, it sets up the difference in elevation of each contour line first. In the example of the topographical map of 1/1000, a high line, i.e., an intermediate contour, such as becoming criteria for

every difference in elevation (0.5m-1m), is usually drawn. Moreover, an auxiliary curve may be compensated with 1/2 of an intermediate contour, or the difference in elevation of a quadrant when only an intermediate contour cannot express the details of geographical feature especially in the loose part of the inclination of geographical feature. The difference in elevation of an intermediate contour and an auxiliary curve can be set as arbitration according to the purpose of a map. Moreover, in order to make a map legible, the index contour in which an intermediate contour is shown by a thick wire etc. for every spacing of arbitration may be formed.

[0024] With the gestalt of this operation, the suitable count approach is chosen out of the existing contour-line generation technique, and the point which a contour line passes based on the altitude value of a reference point 23 and the reference point 25 outside an analytical range is presumed.

[0025] The reference point 25 outside an analytical range is used in order to carry out the chart of the contour line near a boundary with the exterior of an analytical range 21. Even if the reference point 25 outside an analytical range is not set up, the chart of the contour line can be carried out in the core of an analytical range 21. However, in the part near the circumference of an analytical range 21, if the reference point 25 outside an analytical range is not set up, risk of the count for carrying out the chart of the contour line becoming impossible, or a contour line becoming a completely different configuration from actual geographical feature occurs.

[0026] In addition, although the reference point 23 and the reference point 25 outside an analytical range are set up and illustrated in [whole] the duplication section 9 in drawing 4 , the range which sets up the reference point 25 outside an analytical range is suitably chosen according to the count technique used for contour-line generation. It sets up in the rectangular direction at equal intervals like drawing 4 , and also arrangement of a reference point 23 and the reference point 25 outside an analytical range is suitably set up according to the count technique chosen for contour-line generating. It is also possible to add and input into arbitration the altitude data about the point where the altitude has become clear.

[0027] Drawing 5 is drawing showing the master data image 27. The master data for carrying out the chart of the contour line consists of the point data and vector data which were inputted by the plane-coordinates value of a reference point 23 and the reference point 25 outside an analytical range, the altitude value, and the analyst 17 and which show the description of geographical feature. In drawing 5 , although illustrated only about the analytical range 21, it is inputting the point data in which the description of geographical feature is shown also about the part of the outside of an analytical range 21, and vector data, and the chart of the contour line will be carried out in a more exact configuration.

[0028] The peak 31 is illustrated with the gestalt of this operation as point data in which the description of geographical feature is shown. The data about a peak 31 consist of the plane-coordinates value about a point and altitude value which have the highest altitude of a series of geographical features. However, the word of a plane-coordinates value is excluded in the column of the class of data of introductory notes. The plane-coordinates value of the origin of a vector is included also about vector data, and since it is a word common to all items, this is omitted.

[0029] having illustrated with the gestalt of this operation as vector data which shows the description of geographical feature -- the main ridge line 33, a ridgeline (********) 35, a valley line 37, **** 39, and a hill -- it is the ** ridgeline (********) 41. among these, the main ridge line 33, a ridgeline (********) 35, a valley line 37, and a hill -- the ** ridgeline (********) 41 is approximated as that with which a singular vector and two or more vectors were connected in the shape of single track, and **** 39 is approximated as a polygon surrounding a cliff.

[0030] The main ridge line 33 shows the sequence of convex geographical feature which connects two or more peaks 31 as shown in the example of drawing 5 . A ridgeline (********) 35 is the vector which departs from the surrounding high point of a peak 31, the main ridge line 33, and other ridgelines 35, and there are many what goes to the base of a mountain almost in parallel with a valley line 37, and things which go to a valley line 37.

[0031] The difference between the main ridge line 33 and a ridgeline (********) 35 is explained. Since the main ridge line 33 is what connects two or more peaks 31, the main ridge line 33 has high both ends, and at least one on the main ridge line 33 has become a concave. Therefore, the inclination of main ridge

line 33 the very thing is hard flow on both sides of the concave part on the main ridge line 33. When a contour line crosses the main ridge line 33, it is good to divide a concave part as another vector in the part where it inputs as point of inflection of the main ridge line 33, or an inclination changes. When the irregularity of two or more places is on the main ridge line 33 and it becomes clear that point of inflection is inputted altogether beforehand, or a contour line and the main ridge line 33 cross behind, the additional input of the data about the irregularity on the main ridge line 33 may be carried out.
[0032] A ridgeline (********) 35 has the high altitude of the end of a vector, and the altitude of the other end is low. Therefore, it is made for the inclination of ridgeline (********) 35 the very thing to be understood in unifying so that it may start from an edge with the higher altitude, and inputting vector data. Conversely, an edge with the lower altitude may be unified as an origin of a vector. In addition, when a clear change of irregularity or an inclination is accepted on a ridgeline (********) 35, the thing from which point of inflection is inputted as point data, or an inclination differs and which is distinguished as another vector for every part is also possible.
[0033] A valley line 37 is a vector which approximates the ream of the crevice of geographical feature, its end is high, and the other end is low. Also about a valley line 37, a high side is unified as an origin of a vector. Or a low side is unified as an origin of a vector. Moreover, when the lenience and severity of an inclination change clearly, point of inflection is inputted or you may input as a separate vector for every almost same part of an inclination.
[0034] **** 39 approximates and surrounds the upper limit line and lower limit line of a cliff (steep slope range) by the polygon. Even if the inclination is near perpendicularly and a cliff illustrates a contour line like natural geographical feature or an artificial pinion wall, it is the location whose decipherment crowds very much and becomes impossible. On the contrary, existence of a cliff will not be reflected in a contour line without **** 39 data only by the altitude value data of an origin/datum 23 and the origin/datum 25 outside an analytical range, but the rapid difference in elevation of the upper limit of a cliff and a lower limit will be absorbed and leveled on a surrounding inclination. The judgment about what scale of a cliff is surrounded by **** 39 is performed in consideration of the scale of the map which an analyst 17 is going to create etc.
[0035] a hill -- the ** ridgeline (********) 41 distinguishes what has not clear convex geographical feature, and especially the thing that the width of face of convex structure is wide, and cannot show a center line among ridgelines (********) 35, and is shown. a hill -- the ** ridgeline (********) 41 shows the boundary line of the both ends of the convex structure where width of face is wide, as vector data.
[0036] Drawing 6 is drawing showing the first contour-line image 43. The first contour line 45 is a high line -- the chart was calculated and carried out only using the plane-coordinates value and altitude value of a peak 31 which are point data inputted by the origin/datum 23, the origin/datum 25 outside an analytical range, and the analyst 17. However, if the count technique chosen previously uses only lattice point data, the data of a peak 31 will not be used.
[0037] The master data for carrying out the chart of the first contour line 45 is polygon data which consist of a continuation coordinate group. Although it is superimposed on the first contour line 45 and the data inputted by the analyst 17 and they are shown by the first contour-line image 43, in the next phase, the details of the first contour line 45 are corrected using the data inputted by the analyst 17. namely, the first contour line 45 -- the main ridge line 33, a ridgeline (********) 35, a valley line 37, **** 39, and a hill -- the crossover part which intersects either of the ** ridgelines (********) 41 is searched for by count, and the first contour line 45 is corrected in a crossover part, respectively.
[0038] (A) Correct the continuation coordinate group of the contour line of the predetermined range around a crossover part to a side with the low altitude of a ridge line in the part where the first contour line 45, the main ridge line 33, or a ridgeline (********) 35 crosses. At this time, the amount of corrections of a contour line is made into max, the amount of corrections of a contour line becomes small according to the distance from a ridge line, and the coordinate of the continuation coordinate group of a contour line is corrected in a predetermined distance on the intersection of a ridge line and a contour line that the amount of corrections seems to become zero. That is, in a crossover part, a contour

line serves as convex at a side with the low altitude.
[0039] (B) the first contour line 45 and a hill -- correct the continuation coordinate group of the contour line of the predetermined range around a crossover part to a side with the low altitude of a ridge line in the part where the ** ridgeline (********) 41 crosses. 1 set of two hills -- the hill inserted into the ** ridgeline (********) 41 -- the ** part -- it is -- etc. -- the amount of corrections of a high line -- almost -- homogeneity -- carrying out -- a hill -- it continues suitable for the geographical feature of the outside of the ** part -- the coordinate of the continuation coordinate group of a contour line is corrected like.
[0040] (C) Correct the continuation coordinate group of the contour line of the predetermined range around a crossover part to a side with the high altitude of a valley line in the part where the first contour line 45 and a valley line 37 cross. At this time, the amount of corrections of a contour line is made into max, the amount of corrections of a contour line becomes small according to the distance from a valley line, and the coordinate of the continuation coordinate group of a contour line is corrected in a predetermined distance on the intersection of a valley line and a contour line that the amount of corrections seems to become zero.
[0041] (D) When the first contour line 45 and the upper limit line of **** 39 cross by two places, correct the continuation coordinate group of the contour line between crossover parts to the outside of the upper limit line of **** 39 so that it may become an upper limit line and parallel. When the first contour line 45 and the lower limit line of **** 39 cross by two places, the continuation coordinate group of the contour line between crossover parts is corrected to the outside of the lower limit line of **** 39 so that it may become a lower limit line and parallel.
[0042] Drawing 7 is drawing showing the contour-line image 47 after correction. All the continuation coordinate groups of the contour line 49 after correction will be obtained in the phase which the correction of (A), (B), (C), and (D) to the continuation coordinate group of the first contour line of drawing 6 ended. Drawing in which drawing 8 shows the correction part 51 of the direction of a ridge and the correction part 53 of the direction of a valley line, and drawing 9 are drawings showing the correction parts 55a and 55b of a high line, such as intersecting **** 39.
[0043] In the case of an actual chart, radii, a Bezier curve, a spline curve, etc. are used other than the approach of connecting the point which constitutes polygon data in a straight line as it is, and there is the approach of performing and showing smoothing processing in the line which connects a continuation coordinate group.
[0044] As explained to the detail above, with the gestalt of operation of this invention, an exact contour line can be created by the easy activity.
[0045] moreover -- as the description of the geographical feature which an analyst 17 judges with the gestalt of this operation -- a peak 31, the main ridge line 33, a ridgeline (********) 35, a valley line 37, **** 39, and a hill -- although the ** ridgeline (********) 41 was illustrated, point data and vector data may show the description of other geographical features, and you may use for correction of a contour line.
[0046] Moreover, when **** 39 and the first contour line 45 cross, the location which collided with **** 39 may cut and show a contour line. Moreover, it is good also considering the plane-coordinates value of the point of the both ends of a vector as data instead of vector data.
[0047]
[Effect of the Invention] As mentioned above, as explained to the detail, according to this invention, the map data origination approach that an exact contour line can be generated in an easy activity can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The mimetic diagram showing one example of the photography approach of aerial photograph 1a and 1b
[Drawing 2] Drawing showing data processing to aerial photograph 1a and 1b
[Drawing 3] The flow chart which shows the outline of creation of a contour line
[Drawing 4] Drawing showing one example of arrangement of a reference point 23
[Drawing 5] Drawing showing the master data image 27
[Drawing 6] Drawing showing the first contour-line image 43
[Drawing 7] Drawing showing the contour-line image 47 after correction
[Drawing 8] Drawing showing the correction part 51 of the direction of a ridge, and the correction part 53 of the direction of a valley line
[Drawing 9] Drawing showing the correction parts 55a and 55b of a high line, such as intersecting **** 39
[Description of Notations]
1a, 1b ..... Aerial photograph
3 ..... Airplane
5 ..... Flight height
7a, 7b ..... Camera
9 ..... Duplication section
11 ..... Pictorial drawing-ized equipment
13 ..... Data processor
15 ..... Storage
17 ..... Analyst
19 ..... Input unit
20 ..... Output unit
21 ..... Analytical range
23 ..... Reference point (thing in an analytical range)
25 ..... Reference point outside an analytical range
27 ..... Master data image
31 ..... Peak
33 ..... Main ridge line
35 ..... Ridgeline (********)
37 ..... Valley line
39 ..... ****
41 ..... a hill -- the ** ridgeline (********)
43 ..... The first contour-line image
45 ..... Contour line
47 ..... After [correction] contour-line image

49 ..... Contour line after correction
51 ..... Correction part of the direction of a ridge
53 ..... Correction part of the direction of a valley line
55a, 55b ..... Correction part of the **** direction

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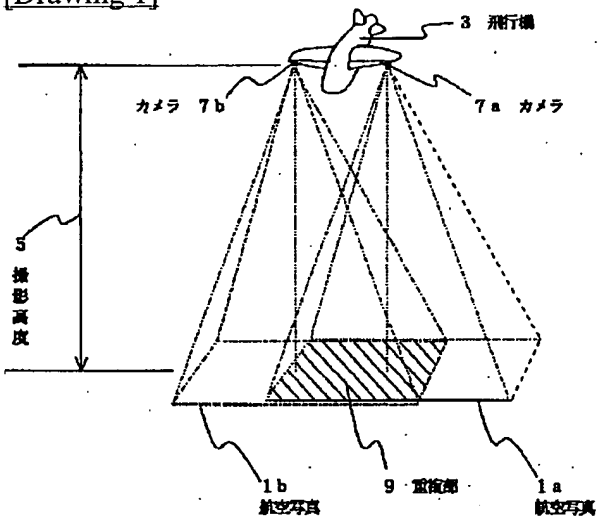
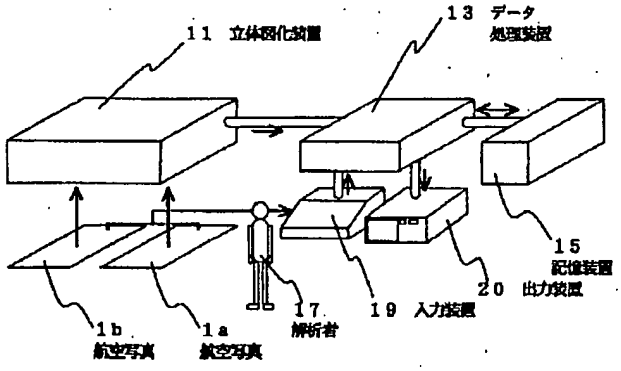
DRAWINGS

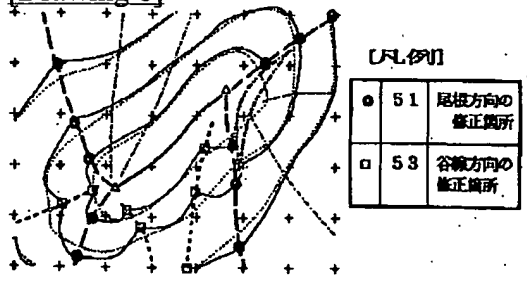
[Drawing 1]



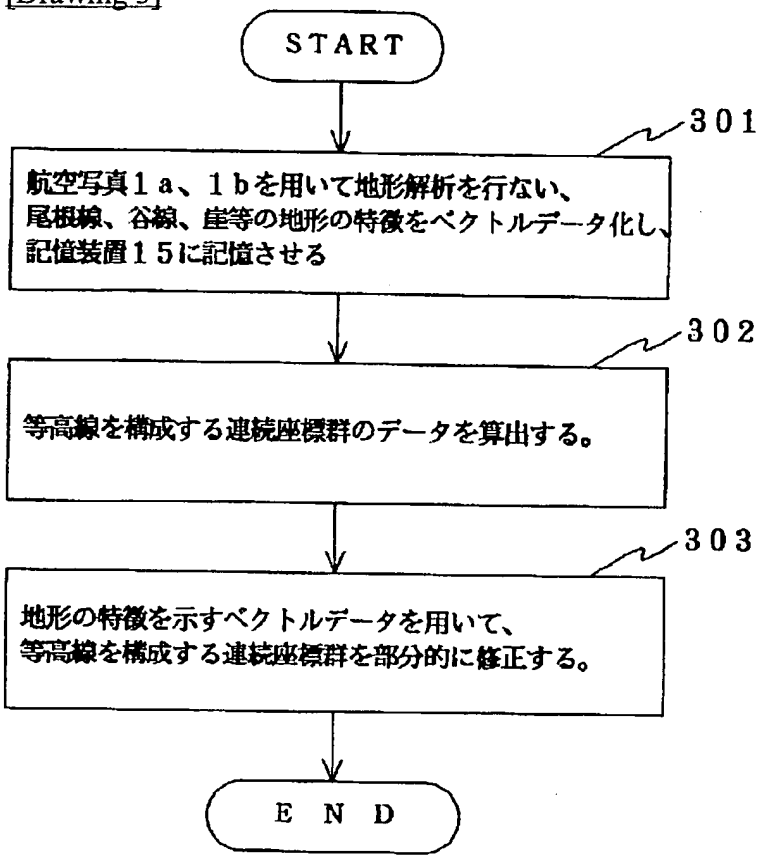
[Drawing 2]



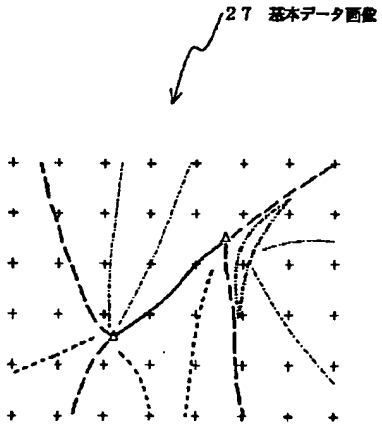
[Drawing 8]



[Drawing 3]



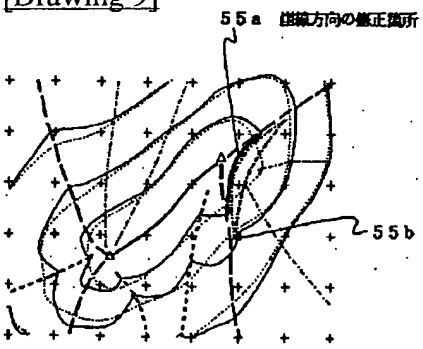
[Drawing 5]



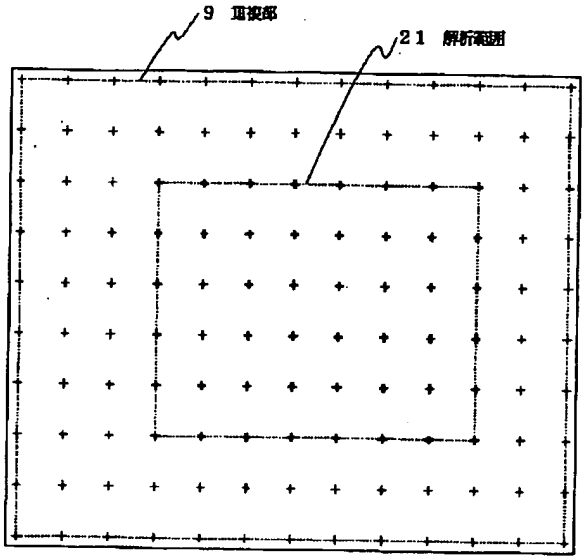
[凡例] 全データに平面座標値を含む

図中の記号	符号	内 容	データの種類
+	23	基準点	標高値
△	31	ピーク	標高値
	33	主尾根線	ベクトル
	35	稜線（従尾根線）	ベクトル
	37	谷線	ベクトル
	39	崖線	ベクトル（ポリゴンで崖を囲む）
	41	丘状微線（従尾根線）	ベクトル

[Drawing 9]



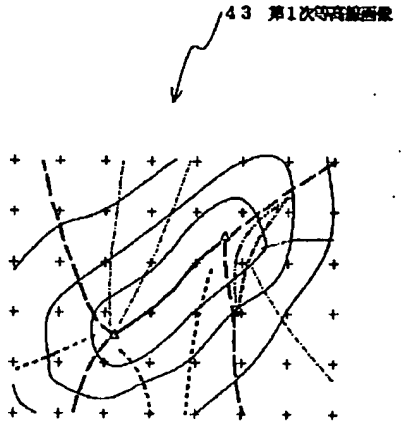
[Drawing 4]



[凡例]

図中の記号	符号	内 容	データの種類
+	23	基準点 (解析範囲21 内のもの)	平面座標値 標高値
+	25	解析範囲外基準点	平面座標値 標高値

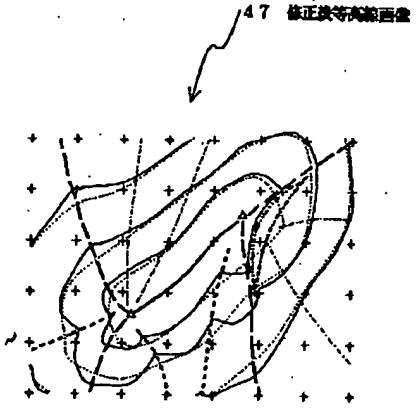
[Drawing 6]



[凡例] 全データに平面座標値を含む

図中の記号	符号	内 容	データの種類
+	23	基準点	標高値
△	31	ピーク	標高値
	33	主尾根線	ベクトル
	35	稜線（従尾根線）	ベクトル
	37	谷線	ベクトル
	39	崖線	ベクトル（ポリゴンで崖を囲む）
	41	丘状稜線（従尾根線）	ベクトル
	45	第1次等高線	ポリゴン

[Drawing 7]



[FL例] 全データに平面座標値を含む

図中の記号	符号	内 容	データの種類
+	23	基準点	標高値
△	31	ピーク	標高値
	33	主尾根線	ベクトル
	35	破線（従尾根線）	ベクトル
	37	谷線	ベクトル
	39	崖線	ベクトル（ポリゴンで崖を囲む）
	41	丘状破線（従尾根線）	ベクトル
	45	第1次等高線（修正前等高線）	ポリゴン
	49	修正後等高線	ポリゴン（スムーシング処理を行う場合もある）

[Translation done.]